Pre-Calc Name_____ ID: 1

Polys D8.5

Date_____ Period____

Divide.

1) $(x^4 + 2x^3 - 17x^2 + 20x - 6) \div (x - 2)$

2) $(6a^4 - 36a^3 - 18a^2 + 66a - 17) \div (6a - 6)$

Factor each completely.

3) $140n^3 + 245n^2 + 100n + 175$

4) $35m^3 - 28m^2 + 20m - 16$

Factor each completely. Use the sum/difference of cubes formulas.

5) $125u^3 - 27$

6) $216 - 125m^3$

Factor each completely.

7) $u^4 + 2u^2 - 80$

8) $12a^4 - 66a^2 + 90$

9) $6m^4 + 7m^2 - 20$

State the possible rational zeros for each function. Then factor each and find all zeros.

10) $f(x) = 3x^4 - 16x^2 + 5$

11) $f(x) = 10x^5 + 5x^4 + 24x^3 + 12x^2 + 14x + 7$

12) $f(x) = 3x^4 + 10x^2 - 8$

13) $f(x) = 3x^5 + 15x^4 - 8x^3 - 40x^2 - 3x - 15$

Describe the end behavior of each function.

14) $f(x) = x^2$

15) $f(x) = -x^2 - 8x - 18$

16) $f(x) = x^2 - 2x + 3$

17) $f(x) = -x^2 + 4x - 1$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

18) $-2,\ 3,\ \frac{1}{3},\ \sqrt{6},\ -\sqrt{6}$

19) $-5,\ 0,\ \frac{2}{3},\ -\frac{2}{5}$

20) $-4,\ -3,\ -\frac{4}{3}$

21) $-3,\ \sqrt{3}$

State the number of complex zeros and the possible rational zeros for each function. Then factor each and find all zeros.

22) $f(x) = x^5 - 3x^4 + 5x^3 - 15x^2 + 4x - 12$

23) $f(x) = x^3 - 13x^2 - x + 13$

24) $f(x) = x^4 - 9$

25) $f(x) = x^4 + 8x^2 + 15$

Answers to Polys D8.5 (ID: 1)

1) $x^3 + 4x^2 - 9x + 2 - \frac{2}{x-2}$

2) $a^3 - 5a^2 - 8a + 3 + \frac{1}{6a-6}$

3) $5(7n^2 + 5)(4n + 7)$

4) $(7m^2 + 4)(5m - 4)$

5) $(5u - 3)(25u^2 + 15u + 9)$

6) $(6 - 5m)(36 + 30m + 25m^2)$

7) $(u^2 + 10)(u^2 - 8)$

8) $6(2a^2 - 5)(a^2 - 3)$

9) $(3m^2 - 4)(2m^2 + 5)$

10) Possible rational zeros: $\pm 1, \pm 5, \pm \frac{1}{3}, \pm \frac{5}{3}$

Factors to: $f(x) = (x^2 - 5)(3x^2 - 1)$

Zeros: $\left\{\sqrt{5}, -\sqrt{5}, \frac{\sqrt{3}}{3}, -\frac{\sqrt{3}}{3}\right\}$

11) Possible rational zeros: $\pm 1, \pm 7, \pm \frac{1}{2}, \pm \frac{7}{2}, \pm \frac{1}{5}, \pm \frac{7}{5}, \pm \frac{1}{10}, \pm \frac{7}{10}$

Factors to: $f(x) = (2x + 1)(x^2 + 1)(5x^2 + 7)$

Zeros: $\left\{-\frac{1}{2}, i, -i, \frac{i\sqrt{35}}{5}, -\frac{i\sqrt{35}}{5}\right\}$

12) Possible rational zeros: $\pm 1, \pm 2, \pm 4, \pm 8, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{4}{3}, \pm \frac{8}{3}$

Factors to: $f(x) = (x^2 + 4)(3x^2 - 2)$

Zeros: $\left\{2i, -2i, \frac{\sqrt{6}}{3}, -\frac{\sqrt{6}}{3}\right\}$

13) Possible rational zeros: $\pm 1, \pm 3, \pm 5, \pm 15, \pm \frac{1}{3}, \pm \frac{5}{3}$

Factors to: $f(x) = (x + 5)(3x^2 + 1)(x^2 - 3)$

Zeros: $\left\{-5, \frac{i\sqrt{3}}{3}, -\frac{i\sqrt{3}}{3}, \sqrt{3}, -\sqrt{3}\right\}$

14) $f(x) \to +\infty$ as $x \to -\infty$
$f(x) \to +\infty$ as $x \to +\infty$

15) $f(x) \to -\infty$ as $x \to -\infty$
$f(x) \to -\infty$ as $x \to +\infty$

16) $f(x) \to +\infty$ as $x \to -\infty$
$f(x) \to +\infty$ as $x \to +\infty$

17) $f(x) \to -\infty$ as $x \to -\infty$
$f(x) \to -\infty$ as $x \to +\infty$

18) $f(x) = 3x^5 - 4x^4 - 35x^3 + 30x^2 + 102x - 36$

19) $f(x) = 15x^4 + 71x^3 - 24x^2 - 20x$

20) $f(x) = 3x^3 + 25x^2 + 64x + 48$

21) $f(x) = x^3 + 3x^2 - 3x - 9$

22) # of complex zeros: 5
Possible rational zeros: $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$
Factors to: $f(x) = (x - 3)(x^2 + 1)(x^2 + 4)$
Zeros: $\{3, i, -i, 2i, -2i\}$

23) # of complex zeros: 3
Possible rational zeros: $\pm 1, \pm 13$
Factors to: $f(x) = (x - 1)(x - 13)(x + 1)$
Zeros: $\{1, 13, -1\}$

24) # of complex zeros: 4
Possible rational zeros: $\pm 1, \pm 3, \pm 9$
Factors to: $f(x) = (x^2 - 3)(x^2 + 3)$
Zeros: $\{\sqrt{3}, -\sqrt{3}, i\sqrt{3}, -i\sqrt{3}\}$

25) # of complex zeros: 4
Possible rational zeros: $\pm 1, \pm 3, \pm 5, \pm 15$
Factors to: $f(x) = (x^2 + 3)(x^2 + 5)$
Zeros: $\{i\sqrt{3}, -i\sqrt{3}, i\sqrt{5}, -i\sqrt{5}\}$